MBA/SMA 0204 With Special Weldable / Solderable Termination Wires for Automotive Applications

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INTRODUCTION

As the electronic contents in automobiles are growing, there is increasing demand of electronic assemblies, such as sensors, to meet specific application requirements.

The overall sensor market is driven by an increased need for safety, reliability, efficiency, comfort, and protection from harsh environment. Vishay has established its presence as one of the highly reliable suppliers of discrete electronic parts for such sensors. Three such applications are covered in this application note.

Vishay Draloric / Beyschlag offers the MBA/SMA 0204 metal film resistors with special wire terminations, which can be either welded or soldered. Traditionally, the resistors are used on the PCB. However, sensor applications require welding or soldering of resistors on lead frames. The special termination wire material includes coppered steel (FeCu), nickel (Ni), and coppered silver (CuAg).

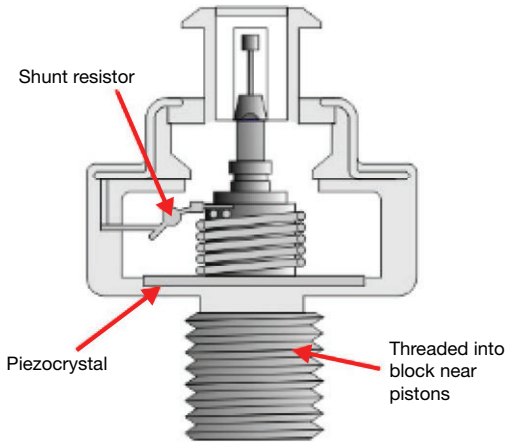
These resistors also exhibit superior TCR for such under the hood (high temperature) applications, excellent long term stability under harsh operating conditions, mechanical robustness in terms of high tensile strength, and high electrical conductivity of the special wires.

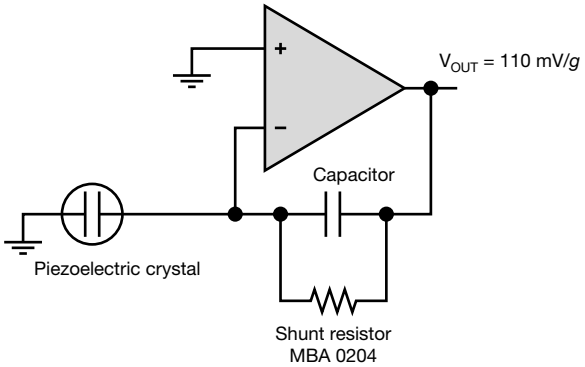
ENGINE KNOCK SENSOR

A knock sensor is a “noise microphone”, which senses engine vibration and converts it to a mV signal.

The engine knock sensor has an MBA/SMA 0204 resistor - popularly used as shunt resistor - with a FeCu termination wire, which makes it possible to weld the resistor externally on metallic terminals. Both resistance welding and ultrasonic welding are supported by such leads.

If the resistor is not used, the high voltage from 400 V to 500 V may damage the ECU. The final sensor is sometimes over-molded.





The output voltage is typically 110 mV/*g*, where “*g*” is vibration represented in terms of acceleration due to gravity (g = 9.8 m/s^2). As the vibration intensity increases, such as 2 *g* or 3 *g*, the mV signal increases correspondingly.

APPLICATION NOTE

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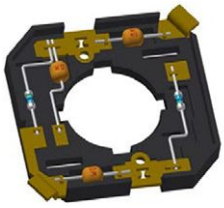
CAMSHAFT AND CRANKSHAFT SENSOR

The basic camshaft uses lobes (called cams) that push against the engine valves to open / close them as the camshaft rotates.

A crankshaft converts “cranks” (the up / down motion of the pistons) to rotational motion.

A hall sensor measures the variation in magnetic flux caused by toothed wheel to measure rotational speed.

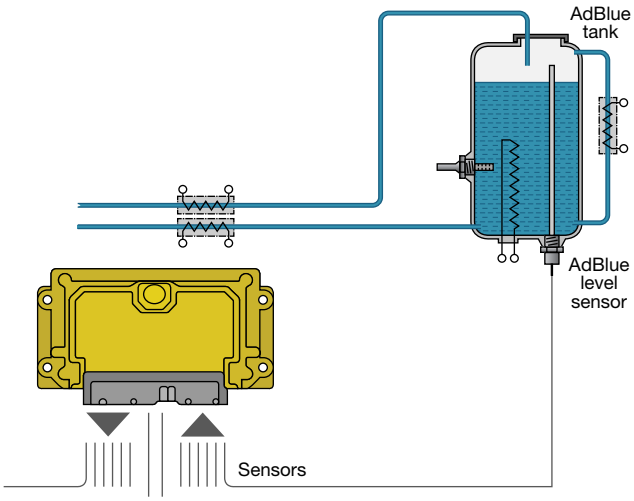
The camshaft and crankshaft sensors have MBA/SMA 0204 resistor with FeCu wires which is used in the RC filter for EMI suppression. The resistor is welded on metallic terminals / lead frame.



AdBlue® LEVEL SENSOR

DEF, which is diesel exhaust fluid (aqueous urea solution), has been standardized as AUS32 in ISO 22241. The German association of the automotive industry (VDA) registered the trademark AdBlue for AUS 32. AdBlue is used as a consumable in order to lower nitrous oxide concentration in the exhaust emissions from diesel engines. To meet emission norms, the AdBlue level should be known and monitored for refills and over-consumption.

The AdBlue level sensor features the MBA/SMA 0204 resistor with NiSn lead wire terminations that remain submerged and withstand aggressive and corrosive fluid. An Sn coating is needed as resistor is soldered.



TECHNICAL SPECIFICATIONS AND VARIETIES OF LEAD TERMINATION WIRES OFFERED WITH MBA 0204

WIRE DIAMETER	WIRE TYPE	VISHAY PART NUMBER	DESCRIPTION
0.50 mm	Cu coated with Sn	MBA02040CxxxxFCx00	MBA / SMA 0204-50 1 % xx xxxx
0.50 mm	Fe (coppered steel)	MBA02040CxxxxFCxFE	MBA / SMA 0204-50 1 % FE xx xxxx
0.50 mm	Ni	MBA0204DCxxxxFCx00	MBA / SMA 0204-50 1 % NI xx xxxx
0.50 mm	Cu clad steel (30 %), Sn coated	MBA02040CxxxxFCxFS	MBA / SMA 0204-50 1 % FS xx xxxx
0.50 mm	Ni coated with Sn	MBA02040CxxxxFCxNS	MBA / SMA 0204-50 1 % NISN xx xxxx
0.50 mm	Cu with Ag 0.1 %	MBA0204BCxxxxFCxCA	MBA / SMA 0204-50 1 % KL AG CT xxxx

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